

U.S. Application No. 10/576,539 -- 2

1 - 37. (canceled)

38. (currently amended) A method of manufacturing a hardfaced plate by applying a cladding of a hard-wearing material to a surface of a cylindrical substrate by arc welding, the method comprising:

~~moving rotating the cylindrical substrate about a horizontal axis in a given direction relative to means for mounting a welding gun;~~

~~mounting the moving a welding gun relative to said cylindrical substrate in a direction generally transverse parallel to said horizontal axis given direction of movement of the substrate; [[and]]~~

feeding a continuous arc welding wire formed of the hard-wearing material from the welding gun to the surface of the substrate, wherein the welding gun feeds the welding wire to the surface of the substrate in ~~[[the]]~~ a direction generally transverse to said horizontal axis, given direction of movement of the substrate, and the substrate is cylindrical and is rotated in the given direction about a generally horizontal axis with respect to the welding gun the welding gun being mounted such that a welding tip thereof is located below an uppermost level of the surface of the rotating cylindrical substrate;

melting the welding wire to provide molten hard-wearing material on the surface of the rotating cylindrical substrate at a location below the uppermost level of the surface of the rotating cylindrical substrate such that the molten material is moved upwards by the rotation of the cylindrical substrate; and

solidifying the molten hard-wearing material to form the cladding on the surface of the cylindrical substrate.

39. (currently amended) A method according to claim 38, wherein the welding gun is mounted at an acute angle to the surface of the substrate ~~so as to clad said welding wire to said surface from one side of the given direction of movement of said substrate.~~

40. (previously presented) A method according to claim 39, wherein the cladding applied to the surface of the substrate is in the form of a continuous weld bead or a plurality of side-by-side weld beads.

41. (currently amended) A method according to claim 40, ~~wherein the method further comprises~~ comprising monitoring a profile(s) of the weld bead(s).

42. (previously presented) A method according to claim 41, wherein said monitoring is carried out as part of a procedure to maintain a desired profile for the cladding.

43. (previously presented) A method according to claim 42, wherein information from the monitoring is used to adjust at least one of a welding current, an arc voltage, speed of movement of the welding gun, speed of movement of the substrate, a welding gun angle, and a stickout distance.

44. (currently amended) A method according to claim 38, ~~wherein the method further comprises~~ comprising moving the welding gun relative to said substrate in the direction generally transverse to said horizontal axis ~~given direction of movement of the substrate~~.

45. (currently amended) A method according to claim 44, ~~wherein the method further comprises~~ comprising oscillating the welding wire transversely or parallel to the horizontal axis ~~direction of movement of the substrate~~ and/or the direction of movement of the welding gun.

46. (currently amended) A method according to claim 38, ~~wherein the method further comprises~~ comprising adjustably pivoting the welding gun to maintain a desired orientation of the welding gun relative to the rotating cylindrical substrate feeding the welding wire to the surface of the rotating substrate at a level below an uppermost level of the rotating cylindrical substrate.

U.S. Application No. 10/576,539 -- 4

47. (currently amended) Apparatus for manufacturing a hardfaced plate by applying a cladding of a hard-wearing material to a surface of a cylindrical substrate by arc welding, the apparatus comprising:

means for rotating the cylindrical substrate about a generally horizontal axis;

means for moving the substrate in a given direction relative to means for mounting a welding gun such that a welding tip thereof is located below an uppermost level of the surface of the rotating cylindrical substrate; ~~and~~

means for mounting a moving the welding gun relative to said cylindrical substrate in a direction generally parallel to said horizontal axis being arranged to mount said welding gun ~~relative to said substrate in a direction generally transverse to said given direction of movement of the substrate; and~~

means for feeding a continuous arc welding wire from the welding gun to the surface of the substrate, wherein the means for feeding is arranged to feed the welding wire to the surface of the substrate in [[the]] a direction generally transverse to said horizontal axis, wherein the cladding is formed on the cylindrical substrate by melting the welding wire onto the rotating cylindrical substrate to provide molten hard-wearing material on the surface of the rotating cylindrical substrate at a location below the uppermost level of the surface of the rotating cylindrical substrate such that the molten material is moved upwards by the rotation of the cylindrical substrate ~~given direction of movement of the substrate, and the substrate is cylindrical and the apparatus has means for rotating the cylindrical substrate in the given direction about a generally horizontal axis with respect to the welding gun.~~

48. (currently amended) Apparatus according to claim 47, wherein the welding gun is mounted at an acute angle to the surface of the substrate ~~so as to clad said welding wire to said surface from one side of the given direction of movement of said substrate.~~

49. (currently amended) Apparatus according to claim ~~[[48]]~~ 47, wherein the means for mounting comprises means for adjustably pivoting the welding gun to maintain a desired orientation of the welding gun relative to the rotating cylindrical substrate ~~feeding is arranged~~

~~to feed the welding wire to the surface of the rotating substrate at a level below an uppermost level of the rotating cylindrical substrate.~~

50. (currently amended) Apparatus according to claim 48 ~~including further means wherein the welding gun is~~ arranged to apply the cladding to the surface of the cylindrical substrate in the form of a continuous weld bead or a plurality of side-by-side weld beads.

51. (currently amended) Apparatus according to claim 49 ~~including further means wherein the welding gun is~~ arranged to apply the cladding to the surface of the cylindrical substrate in the form of a continuous weld bead or a plurality of side-by-side weld beads.

52. (previously presented) Apparatus according to claim 48 including further means arranged to monitor the profile(s) of the bead(s).

53. (previously presented) Apparatus according to claim 49 including further means arranged to monitor the profile(s) of the bead(s).

54. (previously presented) Apparatus according to claim 52 comprising additional means arranged to carry out said monitoring as part of a procedure to maintain a desired profile for the cladding.

55. (previously presented) Apparatus according to claim 53 comprising additional means arranged to carry out said monitoring as part of a procedure to maintain a desired profile for the cladding.

56. (previously presented) Apparatus according to claim 52 including further means for adjusting at least one of a welding current, an arc voltage, speed of movement of the welding gun, speed of movement of the substrate, a welding gun angle, and a stickout distance.

57. (previously presented) Apparatus according to claim 53 including further means for adjusting at least one of a welding current, an arc voltage, speed of movement of the welding gun, speed of movement of the substrate, a welding gun angle, and a stickout distance.

58. (currently amended) Apparatus according to claim 52, wherein the apparatus further comprises means for moving the welding gun relative to said substrate in the direction generally transverse to the horizontal axis ~~said given direction of movement of the substrate~~.

59. (currently amended) Apparatus according to claim 53, wherein the apparatus further comprises means for moving the welding gun relative to said substrate in the direction generally transverse to the horizontal axis ~~said given direction of movement of the substrate~~.

60. (currently amended) Apparatus according to claim 52 including means arranged to oscillate the welding wire transversely or parallel to the horizontal axis ~~direction of movement of the substrate~~ and/or the direction of movement of the welding gun.

61. (currently amended) Apparatus according to claim 53 including means arranged to oscillate the welding wire transversely or parallel to the horizontal axis ~~direction of movement of the substrate~~ and/or the direction of movement of the welding gun.